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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/808,372	03/25/2004	Shin Yasuda	119258	4726
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			EXAMINER CHANG, AUDREY Y	
			ART UNIT 2872	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/808,372

Applicant(s)

YASUDA ET AL.

Examiner

Audrey Y. Chang

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 March 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-40 is/are pending in the application.
- 4a) Of the above claim(s) 1-9, 19-28, 30 and 36-40 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 10-18, 29 and 31-35 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 4/16/2004.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Remark

- This Office Action is in response to applicant's amendment filed on March 28, 2007, which has been entered into the file.
- By this amendment, the applicant has newly added claims 36-40.

Election/Restrictions

1. Applicant's election with traverse of **species B** in the reply filed on **March 28, 2007** is acknowledged. The traversal is on the ground(s) that all species is sufficiently related that a thorough search of the subject matters of any one species would encompass a search for the subject matters of the remaining species and the search would not present undue burden. This is not found persuasive because the applicant has based the argument on his own definition of what constituted a "serious burden" and not the definition provided in the MPEP section 803. The species are mutually exclusive from each other as explicitly stated in the restriction/election requirement (dated February 28, 2007). The angular multiplexing scheme (species A) requires the angle of the reference and signal beams to be **varied** and the recordings are at the same location of the holographic recording medium. The wavelength multiplexing scheme (Species C) requires the wavelengths of the recording beams to be varied. These are mutually exclusive from the elected species (B) for a spatial multiplexing scheme that requires the angle between the recording beams to be **constant**, the **wavelengths being the same** and the location of the recording to be **changed**. The search for the species B certainly will not encompass the search for species A and C, since they are of mutually exclusive subject matters. The examiner therefore demonstrates the serious burden in searching by demonstrating the species being mutually exclusive from each other. In order for applicant to present a cogent argument, the applicant must demonstrate that the different species are obvious variants or clearly so stated on the record. However the applicant has failed to do so.

The requirement is still deemed proper and is therefore made **FINAL**.

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2. **Claims 1-9, 19-28, and 30 are withdrawn** from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected species, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on March 28, 2007.

3. **Newly submitted claims 36-40 are directed to an invention that is independent** or distinct from the invention originally claimed for the following reasons: claims 36-40 are drawn to **rewriting** a second hologram on which a first hologram is recorded. This is **mutually exclusive** from the elected species (B, referred to restriction requirement dated February 28, 2007), concerning writing *different* pages of information (i.e. different hologram and not a rewritten hologram) at *different* spatial position of the holographic recording medium.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, **claims 36-40 are withdrawn from consideration** as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

4. Claims 10-18, 29, and 31-35 remain pending in this application.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. **Claims 12-13, and 31-35 are rejected under 35 U.S.C. 112, first paragraph**, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

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Claims 12 –13 and 34-35 recite “a polarization state of the signal or reference beam ... is caused to be different”. However the specification and claims fail to teach what will cause the polarization state to be different. The specification and the claims are silent about the polarization state of the light source used to irradiate. The claims fail to provide any means that will make the light source to be polarized and any means to make the polarization state to be different. They are therefore non-enabling by the disclosure and the claims.

Claim 31 recites “at a position where a maximum point of light beam intensity of a reproduced light beam is shifted by a predetermined amount when each page of the recorded hologram is reproduced”. It is not clear where does this “reproduced light beam” come from and it is not clear how could the “reproduced light beam” ever be used BEFORE a hologram is recorded.

Claim Objections

7. **Claims 13 and 35 are objected to because of the following informalities:**

8. (1). The phrase “polarization direction of the signal light beam and a polarization direction of the reference light beam ... are caused to be orthogonal to each other” recited in claims 13 and 35 is confusing and indefinite. It is not clear if the polarization states are orthogonal at the location of the optical recording medium or not. If so, then no interference pattern or hologram will ever be recorded since the orthogonal polarization states between the reference light beam and the signal light beam will destroy the coherence between the light beams and no interference pattern or hologram will ever be recorded. However, if this phrase is refer to reference light beam and signal light beam before reaching the optical recording medium, then no optical means has been provided to ensure that the polarization states are parallel to each other at the recording medium. The scopes of the claims are therefore not clear. **For the examination purpose, this phrase is been interpreted referred to polarization states before reaching the recording medium and not at the recording medium. Clarifications however are required.**

Appropriate correction is required.

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

10. **Claims 10, 14, 29 and 31 are rejected under 35 U.S.C. 102(b) as being anticipated by the patent issued to Tanaka et al (PN. 6,301,028).**

Tanaka et al teaches a *holographic recording apparatus and method* that is comprised of a *laser light beam* (15, Figure 2) for emitting a *coherent* light beam, a *beam splitter* (16) for separating the coherent light beam into a *reference* light beam and a *source* light beam (that will serve as the signal light beam), wherein the reference light beam is deflected by a mirror (17) so that optical paths for the reference light beam and the signal light beam are separated and are led to irradiate a volume holographic memory (10), serves as the optical recording medium, at the same time to record the interference pattern between the reference light beam and the signal light beam as hologram. Tanaka et al teaches that a *spatial light modulator* (12) is arranged in the optical path of the source light beam for *modulating* the source light beam in accordance with *recording page data* and therefore *converting* the source light beam into a *signal light beam*, (please see column 5, lines 30-35). The data page information is supplied to the spatial light modulator via an *encoder* (25, Figure 2). Tanaka et al teaches that the *angle* between the reference light beam and the signal light beam can be kept constant, (please see the arrangement explicitly

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shown in Figure 2). The volume holographic memory or the optical recording medium are placed on a *driving unit* (19) serves as the *stage* such that the volume holographic memory can be moved *vertically* so that the recording position for each of the hologram recording *is different*, to allow *spatial multiplexing recording* of the holograms for different pages of the data, (please see column 5, lines 7-49, column 6, lines 49-62 and column 7, lines 13-21).

With regard to claim 14, Tanaka et al teaches that the volume holographic memory or the optical recording medium is comprised of a photorefractive crystal, (please see column 5, lines 46-49).

With regard to claim 31, Tanaka et al teaches that the volume holographic memory or the optical recording medium is moved vertically to achieve *spatial multiplexing recording* of the holograms. This means the page data recorded as the successive holograms are *recorded at different locations*. This means that if the recorded holograms are reproduced, the locations of maximum light intensity of the reproduced holograms will not be overlapped and will be shifted at a predetermined amount.

This reference has therefore anticipated the claims.

11. Claims 10, 12, 29, 31 and 34 are rejected under 35 U.S.C. 102(e) as being anticipated by the patent issued to King et al (PN. 6,721,076).

King et al teaches a *system and method for holographic storage* that are comprised of a *laser light source* (110, Figure 1 and 710 in Figure 7), for emitting a *coherent light beam* and a *beam splitter* (115 or 715), for separating the coherent light beam into a *reference light beam* (120 or 720) and an *object light beam* serves as the *signal light beam* (125 or 725). The optical paths for the reference light beam and the object or signal light beam are being separated by the *beam splitter and associated mirrors* such that they propagate to a *holographic storage media*, serves as the *optical recording medium*, (150 or 750) at the same time so that the interference pattern between the reference light beam and the signal light beam is recorded as the hologram. King et al teaches that a *spatial light modulator* (165 or 755) is provided in the

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optical path of the object or signal light beam to impose a data pattern on the object light beam for recording a *data page* as the hologram. The data pattern is supplied to the spatial light modulator via a *control electronic* (170), (please see column 1, line 53 to column 2, line 6, column 6 line 66 to column 7, line 48). King et al teaches that the holographic storage media (150 or 750) is placed on a *moving assembly* (185), serves as the *stage*, so that the storage media is moved or translated so that the recording positions for each page information is different, to achieve the shift or spatial multiplexing recording method, (please see column 10, lines 49-65).

With regard to claim 31, King et al teaches that the holographic storage media or the optical recording medium is shifted to achieve *spatial or shift multiplexing recording* of the holograms. This means the page data recorded as the successive holograms are *recorded at different locations*. This means that if the recorded holograms are reproduced, the locations of maximum light intensity of the reproduced holograms will not be overlapped and will be shifted by a predetermined amount.

With regard to claims 12 and 34, King et al teaches that the holographic storage media includes a reflective substrate (22, Figure 2A) and a quarter wave plate or polarization shifting layer (24) such that the successive recording of the holograms by using the incident reference light beam and the reflected reference light beam will have the reference light having different polarization state.

This reference has therefore anticipated the claims.

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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13. Claims 11, and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Tanaka et al.

The *holographic recording apparatus and method* taught by Tanaka et al as described for claims 10 and 31 above has met all the limitations of the claims.

Tanaka et al teaches that the volume holographic memory or the optical recording medium is moved vertically to achieve *spatial multiplexing recording* of the holograms, which requires that the location of each holographic recording at the medium is different. This reference however does not teach explicitly that the location corresponding to a light beam intensity of a reproduced light beam from each page of the hologram previously recorded in the optical recording medium is minimized. But such modification is an obvious modification to one skilled in the art for the benefit of minimizing the cross talk or noise between the holograms recorded in the medium.

14. Claims 11, 13, 32, 33 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to King et al.

The system and method for holographic storage taught by King et al as described for claims 10 and 31 above has met all the limitations of the claims.

With regard to claims 11 and 32, King et al teaches that the holographic storage media or the optical recording medium is moved via a moving assembly to achieve shift or *spatial multiplexing recording* of the holograms, which requires that the location of each holographic recording at the medium is different. This reference however does not teach explicitly that the location corresponding to a light beam intensity of a reproduced light beam from each page of the hologram previously recorded in the optical recording medium is minimized. But such modification has to be an obvious modification to one skilled in the art for the benefit of minimizing the cross talk or noise between the holograms recorded in the medium.

With regard to claims 13 and 35, the scopes of the claims are not clear for the reasons stated above. These claims can therefore only be examined in the broadest interpretations. King et al teaches that the holographic storage media or the optical recording medium is structured to have a reflective substrate (22, Figure 2A) and a quarter wave plate (24) associated with it. This means the quarter wave plate will rotate the polarization state of the light beam incident on and reflected back through the reflective substrate by 90 degrees. The polarization state of the **incident** reference light beam (or object light beam) and the **reflected** reference (or object beam) will have orthogonal polarization state. This means the successive recording of the hologram using the reference light beam and the reflected reference light beam can have the polarization state being parallel and orthogonal with respect to the incident object light beam. But since the orthogonal polarization state between the object light beam and the reference light beam will destroy the coherence between the light beams and resulting no hologram record is possible. The polarization state of the object light beam for the second recording (with the reflected reference light beam) has to be rotated. King et al teaches that the successive recording can be achieved by making the object light beam also reflected through the quarter waveplate, (please see columns 3 and 4). By the same general teachings, it would have been obvious to one skilled in the art to modify the polarization states of the reference light beam and the object light beam to assume any state as long as they have the parallel polarization state as they interfere at the recording medium.

With regard to claim 33, King et al teaches that in the reconstructing phase, the reproduced hologram (or the diffracted light beam from the recorded hologram) is reconstructed by illuminating the medium with a reference beam (320, Figure 3) and the reconstructed hologram light beam is received by the polarization beam splitter (352) with certain polarization state (serves as the analyzer) to allow the reconstructed light beam to be detected by a detector, (354). Although this reference teaches a reflected instead of a transmitted signal is being detected, however such modification is considered to be obvious to

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one skilled in the art since it only requires rearranging part to make the polarization beam splitter transmitting and reflecting different polarization states as shown in the Figure.

15. Claims 15-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to King et al in view of the patent issued to Hesselink et al (PN. 7,129,006).

The system and the method for holographic storage taught by King et al as described for claim 10 above has met all the limitations of the claims.

King et al teaches that the holographic storage medium is comprised of photopolymer, (please see column 7, line 53), however it does not teach explicitly that the medium is comprised of the materials claimed in the claims. **Hesselink** et al in the same field of endeavor teaches a variety of materials that are suitable for holographic recording medium. Hesselink et al teaches that photopolymer such as photo-addressable "side-chain" polymers can be suitable for holographic recording medium. This included *azobenzene* material, (please see column 26, lines 52-60). This material is polarization-sensitive. Hesselink et al also teaches that *photochromic* material is suitable for holographic recording medium, (please see column 6, lines 44-46). It would then have been obvious to one skilled in the art to apply the teachings of **Hesselink** et al to modify the holographic storage media of King et al to use the different suitable materials to record the hologram for the benefit of fulfilling different efficiency for different applications required.

Double Patenting

16. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In*

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re Vogel, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

17. **Claims 10, 29 and 31 are rejected on the ground of nonstatutory obviousness-type double patenting** as being unpatentable over claim 4 of U.S. Patent No. 7,218,597. Although the conflicting claims are not identical, they are not patentably distinct from each other because they both claim a holographic recording for multiple recording a plurality of page. The angle between the reference light beam and the signal light beam is fixed and one of the reference light beam, the object light beam and the optical recording medium is moved to change the recording position.

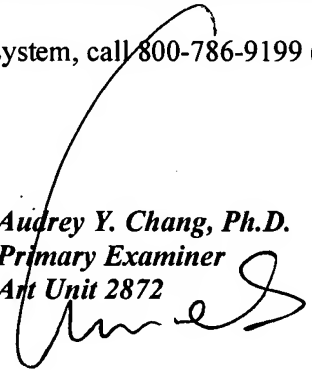
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Audrey Y. Chang whose telephone number is 571-272-2309. The examiner can normally be reached on Monday-Friday (8:00-4:30), alternative Mondays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephone B. Allen can be reached on 571-272-2434. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Audrey Y. Chang, Ph.D.
Primary Examiner
Art Unit 2872



A. Chang, Ph.D.